

REMARKS

The Official Action of 22 July 2008 has been carefully considered and reconsideration of the application as amended is respectfully requested.

New claims 9-20 have been added more completely to define the subject matter which Applicants regard as their invention. The recitations in new claims 9-22 correspond with recitations in the original claims and also draw support from the specification as filed at, for example, page 6, lines 4-20 and Figs. 1 and 2.

Claims 1 and 3-8 were rejected under 35 USC 102(b) as allegedly being anticipated by Towler et al as evidenced by Gallagher et al. Claim 2 was rejected under 35 USC 103(a) as allegedly being obvious over Towler et al in view of Christel Jr. et al. Applicants respectfully traverse these rejections.

The claims recite a method for purifying air, which is supplied for reaction to alkaline fuel cells (FC), of carbon dioxide. For this purpose the starting air is passed through an adsorber with an adsorbent of carbon dioxide and then the adsorbent is regenerated. This method for purifying distinguishes over the cited art in that, among other things, an adsorbent comprising hydrated oxides of transition metals are regenerated at a temperature of 60-120°C and a relative humidity of from 15 to 85% by the air spent in a fuel cell.

Towler does not describe these claim features and the portions of the reference cited

by the Examiner are respectfully inapposite. Thus, for example, Towler does not describe purifying **air** supplied for reaction to alkaline FC of carbon dioxide. Towler discloses a method for preparing pure hydrogen by way of reforming hydrocarbons in a stream of, e.g., natural gas (but not air-- see Towler at col. 8, lines 50-53), and carrying out exchange reaction in order to reduce the contents of **carbon oxide** (not carbon dioxide), which poisons the FC catalyst, in hydrogen. It is pointed out that further purification of hydrogen, if necessary, can be carried out by way of passing a hydrogen-containing gas through a pressure swing adsorption zone or through a temperature swing adsorption zone, whereupon a pure hydrogen stream and a gas stream containing carbon oxide are separated. However, Towler does not disclose how the gases are purified and separated.

In claim 17 and elsewhere, Towler makes reference to an adsorbent that selectively removes **carbon oxide**, but nothing is said about removing carbon dioxide from air. Moreover, what is discussed in Towler at column 10 (lines 28-30) is not heat regeneration of the adsorbent, but utilization of the heat released in the course of exchange reaction at the step of preliminary reforming. In column 14 (lines 14-22) reference is made to catalysts for low-temperature exchange reaction rather than of an adsorbent that is used in the adsorber.

In Towler, column 15 (lines 11-15), it is said that a humid hydrogen stream regenerates carbon dioxide. There is no data whatsoever about regeneration of the adsorbent leaving a fuel cell by humid air that is free of carbon dioxide.

In short, in the pending claims, the adsorbent comprises hydrated oxides of transition metals (in a preferred embodiment -- a hydrated oxide of zirconium), and

regeneration is effected by the air spent in a fuel cell. This air contains practically no carbon dioxide, inasmuch as a larger portion thereof has been already removed at the fuel cell inlet, whereas the remainder has been adsorbed in the fuel cell itself where an alkaline electrolyte is used. Air humidity gets reduced down to from 15 to 85% by way of additional heating thereof to a temperature higher than that at which the air leaves the fuel cell, while having a relative humidity close to 100%. Towler contains nothing to show or suggest regeneration of the claimed adsorbents with air spent in a fuel cell.

The secondary reference cannot supplement the deficiencies in the primary reference. In Gallagher, disclosure is made of composites containing inorganic components. In column 9 (lines 27-30), Gallagher mentions that zirconia is prepared from precipitated zirconium hydroxide. There is no data whatsoever about the use of hydrated oxides of transition metals as an adsorbent of carbon dioxide or the regeneration thereof with air spent in a fuel cell.

With specific respect to the rejections of claims 3 and 4 based on Towler at Figs. 1 and 3 and column 20 (lines 17-21) and column 22 (lines 14-17 and 54-56), Applicants respectfully note that these portions of the reference do not show the claimed features. Fig. 1 of Towler presents a flow chart of preparing hydrogen for reforming that has nothing to do with the device claimed in claims 3 and 4. In column 22 (lines 14-17, 54-56), information is given about parameters of air supplied into the system for preparing hydrogen. Data on connecting the adsorbers, fuel cell and air flow blower are non-existent.

Fig. 3 of Towler describes a device for preparing hydrogen from hydrocarbons by

means of their reforming. The device comprises a partition 237 separating the combustion zone from the reforming zone to prevent mixing the reforming products and combustion products. There is no information about the presence of adsorbers in a single housing, which are positioned rotatably therein.

With respect to the rejection of claims 2 and 7, the Examiner points to Towler at column 14 (lines 14-22), and Gallagher at column 9 (lines 27-20). Claim 2 recites that air fed for regeneration is heated until a relative humidity of from 15 to 85% is achieved whereas claim 7 recites that a hydrated oxide of zirconium is used as the adsorber. In Towler, column 14 (lines 14-22), information is given about cooling the exchange reaction zone and about a catalyst for low-temperature exchange reaction. In Gallagher, column 9 (lines 27-30), information is given that an oxide of zirconium for a composite material is prepared from precipitated zirconium hydroxide. In these references, there is no data at all which are concerned with the features of claims 2 and 7.

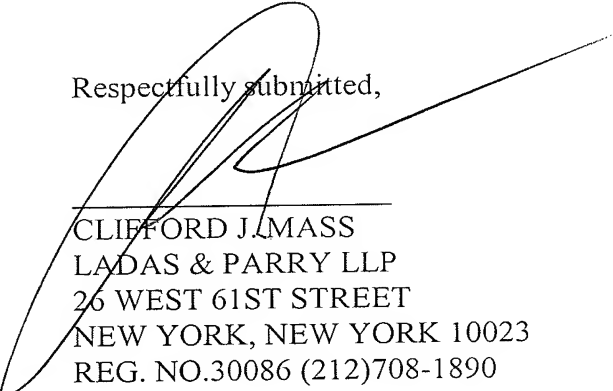
With respect to the rejection of claims 6 and 8, the Examiner refers to Towler at column 20 (lines 17-21) referring to Fig. 3. Fig. 3 of Towler describes a device for preparing hydrogen from hydrocarbons by means of their reforming. The device comprises a partition 237 separating the combustion zone from the reforming zone to prevent mixing the reforming products and combustion products. There is no information about the presence of adsorbers in a single housing, which are positioned rotatably therein. There are also no data on the presence of thermal insulation inside the adsorbers and heaters.

Claim 2 has been rejected with reference to Towler and Christel. As discussed,

Towler describes a method for preparing pure hydrogen from hydrocarbons, and Christel describes a method and device for adsorbing water vapors. Claim 2 recites that air fed for regeneration is heated until a relative humidity of from 15 to 85% is achieved. The features recited in claim 2 do not exist in the cited references.

In view of the above, Applicants respectfully submit that the cited references do not show or suggest the features of the invention being claimed whereby the references cannot set forth even a *prima facie* case of obviousness. Accordingly, Applicants respectfully believe that all rejections and objections of record have been overcome and that the application is now in allowable form. An early notice of allowance is earnestly solicited and is believed to be fully warranted.

Respectfully submitted,



CLIFFORD J. MASS
LADAS & PARRY LLP
26 WEST 61ST STREET
NEW YORK, NEW YORK 10023
REG. NO.30086 (212)708-1890